REMARKS

The Drawings, Specification, and claims 1, 3-5, 7-9, and 12-18 have been amended. Claims 19 and 20 have been canceled. Claims 21-30 have been added. Thus, claims 1-18 and 21-30 are currently pending in the case. Further examination and reconsideration of the presently claimed application is respectfully requested.

Election/Restriction of Claims:

To expedite prosecution of the presently claimed case, non-elected claims 19 and 20 have been canceled. However, Applicants reserve the right to file a divisional application at a later date capturing the subject matter recited in non-elected Group II claims 19 and 20.

Objections to the Drawings:

The drawings were objected to for failing to comply with 37 CFR 1.84(p)(4) and 1.84(p)(5). The Examiner's thorough review of the drawings and Specification is appreciated. In response to the issues raised in the Office Action, a Request for Approval of Drawing Changes has been attached. As illustrated on the accompanying drawings, reference number 320 of Fig. 2 has been changed to reference number 310 designating the induction coil of wetting layer deposition chamber 300. Similarly, reference number 310 of Fig. 2 has been changed to reference number 320 designating the ionizing element of chamber 300. In addition, the reference line for reference number 320 has been extended to more clearly identify the ionizing element. Reference number 311 has also been added, referencing the sidewalls of chamber 300. The indicated changes will be incorporated into the final, formal drawings to be filed when the application is allowed. Moreover, the Specification has been modified to more accurately reference the components of the drawings. In particular, reference number 320 of Fig. 2 has been identified as the induction coil of chamber 300. Furthermore, the Specification has been modified to identify reference numbers 404 and 406 of Fig. 3 as the target assembly and pedestal, respectively. These changes along with other modifications to the Specification are submitted for clarification purposes only and thus do not present new matter. Pursuant to 37 C.F.R. 1.121, it is requested that the submitted changes be approved by the Examiner.

<u>Section 112 Rejections:</u>

Claims 6-8, 10, and 12-18 were rejected under 35 U.S.C. § 112, second paragraph as being indefinite. As shown above, the limitations of a dielectric layer and a cavity have been added to claim 1. As such, sufficient antecedent basis is now present for such limitations in claims 6, 8, and 10. The limitation of "microelectronic topography" in claim 7 has been changed to "topography," which has sufficient antecedent basis in claim 1. In addition, the terms of "cold sputtering" and "hot sputtering" of claims 12-18 have been modified to "sputter depositing at a first temperature" and "sputter depositing at a second temperature," respectively. Support for this amendment may be found, for example, on page 8, lines 8-12, of the Specification. As such, the modifications of claims 12-18 with respect to the inclusion of sputter depositing at first and second temperatures does not present new matter.

Claims 14 and 15 were rejected for being indefinite for using the terms "conditions." However, claim 15 does not contain the term "conditions." It is assumed, for the purposes of this response, that the rejection was intended for claims 13 and 14. Consequently, this response addresses the term "conditions" used in claims 13 and 14. The Office Action states that the term "conditions" is a relative term that renders the claims indefinite. As will be set forth in more detail below, the term "conditions" is commonly used in the claims of issued patents and therefore, is not considered a relative term. Furthermore, it is asserted, as explained below, that the term "conditions" is defined by the claims and the Specification does provide a standard for ascertaining the requisite degree of certainty. Therefore, one of ordinary skill would be apprised of the scope of the invention with the use of the term "conditions" in claims 13 and 14. Consequently, the term "conditions" does not render claims 13 and 14 indefinite or unclear.

During a recent search of U.S. patents issued between 1996 and 2001, 31,651 patents were found with claims containing the term "conditions." Moreover, 18,437 of those patents were method claims. The patent search was further refined by searching for claims containing the term "metallization" to show that the term "conditions" is commonly used in claims of patents related to the art of the present application. As a result, 21 patents were found containing the terms "conditions," "method," and "metallization." In particular, claim 2 of U.S. patent 6,114,188 to Oliver et al. recites in part, ". . . forming said CTMO-film on a native

substrate under conditions necessary for providing film properties for integrated device fabrication . . ." (Emphasis added). Furthermore, claim 1 of U.S. Patent 6,140,228 to Shan et al. recites in part, ". . . depositing a second amount of metal . . . under conditions sufficient to provide a metal diffusion rate and a metal deposition rate sufficient to inhibit void formation ..." (Emphasis added). Another example of using the term "conditions" in claims is cited in part, in claim 1 of U.S. Patent 5,700,726 to Huang et al., ". . . using conditions that produce a said first tungsten layer that will exhibit a fast removal rate when subjected to a specific dry etch chemistry . . ." (Emphasis added). Consequently, the term "conditions" is asserted to be commonly accepted as definite claim terminology.

In addition, the Office Action states that the Specification does not appear to "disclose or define the conditions that do and do not cause significant reflow of the bulk material." On the contrary, it is asserted that the Specification does indeed define conditions that specifically prevent and cause reflow of the bulk metal layer. More specifically, examples of such conditions are clearly specified in the first and second paragraphs of pages 26 and 27, respectively. Some clear distinctions between conditions of preventing and causing reflow of the bulk metal layer include a decrease in DC power supplied to the metal supply target during the transition between deposition of the first and second portions of the bulk metal layer. Another distinction includes the application of gas to the backside of the topography during the deposition of the second portion of the bulk metal layer. The application of gas during such a deposition preferably heats the topography to a temperature greater than 300 °C. As such, "second portion 216 is preferably at a temperature sufficiently high that it may be capable of reflowing immediately after being deposited." (Specification, page 24, lines 2-4).

In addition, the statement on page 28, lines 8-9 merely implies that the process conditions used to deposit the first and second portions of the bulk metal layer may, in some embodiments, be similar or interchangeable. However, in some embodiments, the process conditions used to prevent or cause the bulk metal layer to reflow may be incorporated into the process conditions used to deposit the bulk metal layer. In such an embodiment, the processing conditions used to prevent or cause the bulk metal layer to reflow may not necessarily contribute to the actual deposition of the bulk metal layer, but may included at the same time

the bulk metal layer is being deposited. This embodiment is a narrower limitation of claim 12 and therefore is included in claims (i.e., claims 13 and 14) dependant from claim 12.

For at least the reasons stated above, the term "conditions" in claims 13 and 14 is asserted to be definite and clearly defined in the Specification. As such, claims 13 and 14 are asserted to be definite.

In regard to the § 112, second paragraph, rejections of claims 6-8, 10, and 12-18, claims 1 and 7 have been amended and consequently resolve the "lack of antecedent basis" issues of claims 6-8 and 10. In addition, claims 12-18 have been amended to clarify the depositing characteristics of the first and second portions of the bulk metal layer. Furthermore, the § 112, second paragraph rejections of claims 13 and 14 have been traversed and are asserted to be definite for the reasons stated above. Accordingly, removal of the § 112, second paragraph, rejections of claims 6-8, 10, and 12-18 is respectively requested.

Section 102(e) Rejections:

Claims 1, 3-5, and 11 were rejected under 35 U.S.C. § 102(e) as being unpatentable over either U.S. Patent No. 6,177,350 to Sundarrajan et al. ("Sundarrajan"). As will be set forth in more detail below, removal of the § 102(e) rejection of claims 1, 3-5, and 11 is respectfully requested.

Sundarrajan is not available as prior art against the current application. To expedite prosecution, a declaration under 37 C.F.R. § 131 is filed with this response. The declaration establishes an invention date prior to April 14, 1998 for the subject matter of the current claims. Because Sundarrajan was filed on April 14, 1998, it is not available as prior art under 35 U.S.C. § 102(e) against these claims. Accordingly, removal of the 102(e) rejection of claims 1, 3-5 and 11 is respectfully requested.

Section 103(a) Rejections:

Claims 1 and 3-11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Sundarrajan in view of "Magnetron Sputter Deposition with High Levels of Metal Ionization" by Rossnagel et al. ("Rossnagel-93"). Claims 1-5 and 11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Sundarrajan in view of U.S. Patent No. 6,045,666 to Satitpunwaycha et al. ("Satitpunwaycha"). Claims 1-5, 11-14, and 16-18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,156,645 to Geha et al. ("Geha") in view of either "Metal Ion Deposition from Ionized Magnetron Sputtering Discharge" by Rossnagel et al. ("Rossnagel-94") or Satitpunwaycha. Claims 6-8 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Geha in view of either Rossnagel-94 or Satitpunwaycha and in further in view of Rossnagel-93. Claims 9 and 10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Geha in view of either Rossnagel-94 or Satitpunwaycha and further in view of U.S. Patent No. 5,371,042 to Ong ("Ong"). Claim 15 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Geha in view of either Rossnagel-94 or Satitpunwaycha and further in view of U.S. Patent No. 5,288,665 to Nulman ("Nulman"). As will be set forth in more detail below, removal of the § 103(a) rejections of claims 1-18 is respectfully requested.

To establish a *prima facie* obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974), MPEP 2143.03. Obviousness cannot be established by combining or modifying the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion or incentive to do so. *In re Bond*, 910 F. 2d 81, 834, 15 USPQ2d 1566, 1568 (Fed. Cir. 1990). The cited art does not teach or suggest all limitations of the currently pending claims, some distinctive limitations of which are set forth in more detail below.

Geha is not available as prior art for the current rejection. As noted above, claims 1-9 and 11-18 were rejected over a combination of Geha and other cited art. Because the current application has a priority date of December 30, 1999, Geha is available as prior art against the present claims only under 35 U.S.C. § 102(e). Under the American Inventors Protection Act of 1999 ("the AIPA"), prior art available only under 35 U.S.C. § 102(e) is not usable in a 35 U.S.C. § 103 rejection if the art meets the common ownership requirements of 35 U.S.C. § 103(c) as amended.

The following is a quotation of the revised 35 U.S.C. § 103(c) (as of December 14, 2000):

> Subject matter developed by another person, which qualifies as prior art only under one of more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

The AIPA therefore amended 35 U.S.C. § 103(c) to state that art which qualifies as prior art only under 35 U.S.C. §§ 102(e), (f), or (g) is not available for rejections under 35 U.S.C. § 103 if that art was commonly owned or subject to an obligation of assignment at the time the subject invention was made. This change to 35 U.S.C. § 103(c) is effective for any application filed on or after November 29, 1999.

It is noted that upon filing of the present application, the patent to Geha and the present application were commonly owned by or subject to an obligation of assignment to the same assignee, Cypress Semiconductor Corporation of San Jose, CA. The reel/frame assignment for Geha is recorded in the PTO as 8234/0189. The assignment for the present application 09/476,669 is recorded at reel 010496, frame 0572. In addition, the present application is an application for patent filed after November 29, 1999, and thus is subject to the amendments to §103(c) made by the AIPA. Consequently, Geha is not available as prior art against claims of the present application. Removal of the 35 U.S.C. § 103(a) rejection of claims in regard to Geha is, therefore, respectfully requested.

None of the remaining cited art teaches or suggests applying a sufficient bias power to splash deposited metal at the bottom of a cavity to sidewalls of the cavity. Amended claim 1, recites in part, ". . . applying a sufficient bias power to splash deposited metal at the bottom of the cavity to sidewalls of the cavity . . ." Support for this limitation may be found, for example, on page 21, lines 1-3 of the Specification. Neither Ong nor Nulman teach applying a bias power to splash deposited metal at the bottom of a cavity to sidewalls of the cavity. In fact, neither Ong nor Nulman teach applying a bias power during a deposition process. As such, there is no motivation within Ong or Nulman to limitations of amended claim 1.

Satitpunwaycha, Rossnagel-93, and Rossnagel-94 each teach applying a bias during an ion metal plasma deposition process. However, there is no teaching, suggestion, or motivation provided within Satitpunwaycha, Rossnagel-93, or Rossnagel-94 to apply a bias at an energy level sufficient to splash deposited metal at the bottom of a cavity to sidewalls of the cavity. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on the applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991) MPEP 2142. Satitpunwaycha, Rossnagel-93, and Rossnagel-94 suggest applying a bias with which to control the directionality and deposition rate of metal atoms from a target supply. However, none of the cited references suggest applying such a bias with which to splash the deposited metal. Furthermore, Satitpunwaycha, Rossnagel-93, and Rossnagel-94 do not discuss redistributing or enhancing the overall coverage of the wetting layer on the sidewalls and bottom of the cavity. Consequently, it would not be obvious to one skilled in the art to apply a sufficient bias in order to splash the deposited metal atoms. As such, there is no motivation within the cited art to teach the limitations of claim 1. Accordingly, claim 1 is asserted to be non-obvious and patentably distinct over the cited art.

None of the available cited art teaches or suggests sputter depositing a third portion of a bulk metal layer at a lower temperature than a temperature used during the sputter deposition of a second portion of the bulk metal layer. Amended claim 12 recites in part, ". . . in said second deposition chamber, sputter depositing at a third temperature a third portion of the bulk metal layer upon said second portion, wherein said second temperature is higher than the third temperature." Support for this limitation may be found, for example, on page 28, lines 13-19.

Neither Rossnagel-93 nor Rossnagel-94 discuss depositing a bulk metal layer in separate steps. Satitpunwaycha and Ong only teach the deposition of a bulk metal layer in two steps. Therefore, there is no motivation within Rossnagel-93, Rossnagel-94, Satitpunwaycha, or Ong to include a third deposition step of a bulk metal layer at a temperature lower than a temperature used during a second deposition step. Nulman, on the other hand, does teach depositing aluminum in three steps. However, Nulman appears to teach the third deposition temperature at the same temperature used during the second deposition step. "The wafer temperature may

be maintained during this third phase of the deposition step at the same level as during the second phase, i.e., at a level of from at least about 400 °C to about 600 °C." (Nulman -- col. 5, lines 20-24.) As such, there is no teaching or motivation within Nulman or the rest of the available cited art to teach the limitations of amended claim 12. In addition, Nulman is silent to forming a wetting layer. Therefore, there is no motivation to combine the available cited art to teach the limitations of amended claim 12. Accordingly, claim 12 is asserted to be non-obvious and patentably distinct over the cited art.

Whether take separately or in combination, none of the cited art teaches or suggests the limitations of amended claims 1 and 12. Therefore, claims 1 and 12 are patentably distinct over the cited art. Claims 2-11 and 13-18, which are dependent from claims 1 and 12, are patentably distinct over the cited art for at least the same reasons. Accordingly, removal of the § 103(a) rejection of claims 1-18 is respectfully requested.

Patentability of the Added Claims:

The present amendment adds claims 21-30. Claims 21-23, which are dependent from claims 1 and 12, are patentably distinct from the cited art for at least the same reasons as those claims. In addition, claims 24-30 are asserted to be patentably distinct over the cited art for at least the reasons set forth below.

None of the available cited art teaches or suggests applying a gas to the backside of a topography during the fabrication of a metallization structure. Added claim 24 recites in part, "[a] method for fabricating a metallization structure, comprising . . . applying a gas to the backside of the topography . . ." Support for this limitation may be found, for example, on page 19, lines 1-2. Neither Rossnagel-93, Rossnagel-94, Satitpunwaycha, Ong, nor Nulman discuss or suggest the application of a gas to the backside of a topography during the fabrication of a metallization structure. Since none of the available cited art teaches or suggests such a limitation, there is no motivation within the cited art to teach such a limitation. Therefore, added claim 24 appears to be patentably distinct over the cited art.

None of the available cited art teaches or suggests ion metal plasma depositing a wetting layer consisting essentially of titanium and substantially an entirety of a bulk metal layer on and in contact with the wetting layer as recited in new claim 30. Added claim 30 recites in part, ". . . ion metal plasma depositing a wetting layer consisting essentially of titanium . . ." Support for this limitation may be found, for example, on page 16, lines 22-24. Neither Rossnagel-93 nor Nulman teach the formation of such a wetting layer. In particular, Rossnagel-93 states "[a] new deposition technique has been developed which combines conventional magnetron sputter deposition with a rf inductively coupled plasma (RFI)." (Rossnagel-93 -- Abstract, lines 1-2). In addition, Rossnagel-93 states that "[r]esults from this work, as well as characteristics of the filling or lining of trenches and vias will be discussed elsewhere." (Rossnagel-93 -- pg. 3287, col. 1, 3rd full paragraph, lines 5-7). As such, Rossnagel-93 appears to be silent with regard to forming a wetting layer. Nulman, on the other hand, teaches depositing optional barrier layer 18 of ". . . titanium nitride or titanium/tungsten" (Nulman -- col. 2, line 68). Nulman does not teach or suggest depositing such a layer using ion metal plasma. Therefore, there is no teaching, suggestion, or motivation within Rossnagel-93 or Nulman to form a wetting layer as recited in new claim 30.

In addition, Rossnagel-94, Satitpunwaycha, and Ong do not teach depositing substantially an entirety of a bulk metal layer on and in contact with a wetting layer consisting essentially of titanium . In particular, Rossnagel-94 teaches depositing a titanium nitride film, "TiN films were deposited using the present experiment . . ." (Rossnagel-94 -- pg. 452, col. 2, 2nd full paragraph, line 1). Satitpunwaycha teaches the forming a tri-layer wetting layer comprising titanium, titanium nitride, and graded titanium nitride. In some cases, Satitpunwaycha teaches "the elimination of either one or both of the titanium layer and the graded titanium nitride layer." (Satitpunwaycha -- col. 7, lines 19-20). However, in such an embodiment, the wetting layer would still contain a titanium <u>nitride</u> layer.

Ong, on the other hand, arguably teaches depositing a wetting layer of titanium. However, Ong also discloses forming a barrier layer of titanium/titanium nitride before the deposition of the wetting layer. As such, such a barrier layer prevents the wetting layer from being deposited on the base and sidewalls of contact opening 5. Alternatively, if the wetting layer is deposited prior to the barrier layer, then the bulk metal layer may not be formed on and

in contact with the wetting layer. As such, either (i) the wetting layer of Ong is not deposited on the base and sidewalls of contact opening 5 or (ii) the bulk metal layer is not in contact with the wetting layer. Furthermore, there is no teaching or suggestion to omit the barrier layer. In fact, Ong specifically teaches that the barrier layer is necessary since it "prevents aluminum spiking through the junction." (Ong -- col. 3, lines 22-23). In addition, neither the barrier layer nor the wetting layer of Ong is deposited by ion metal plasma deposition. As such, there is no motivation to combine the available cited art to teach the limitations of added claim 30. Obviousness cannot be established by combining or modifying the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion or incentive to do so. *In re Bond*, 910 F. 2d 81, 834, 15 USPQ2d 1566, 1568 (Fed. Cir. 1990). Therefore, added claim 30 is asserted to be patentably distinct over the cited art.

For at least the reasons cited above, none of the cited art teaches the limitations of added claims 24 and 30. Thus, claims 24 and 30 are patentably distinct over the cited art. Claims 25-29, which are dependent from claim 24, are patentably distinct over the cited art for at least the same reasons. As stated above, claims 21-23, which are dependent from claims 1 and 12, are patentably distinct from the cited art for at least the same reasons as those claims. Accordingly, allowance of claims 21-30 is respectfully requested.

CONCLUSION

In this response, the Drawings, Specification, and claims 1, 3-5, 7-9, and 12-18 have been amended. Claims 19 and 20 have been canceled. Claims 21-30 have been added. Applicants have responded to the election and restriction of claims 19 and 20 as well as the objections to the drawings. Applicants have also responded to the rejection of claims 1-18. Therefore, this response constitutes a complete response to all issues raised in the Office Action dated March 12, 2001. In view of the remarks traversing the rejections, Applicants assert that pending claims 1-18 and 21-30 are in condition for allowance. If the Examiner has any questions, comments, or suggestions, the undersigned attorney earnestly requests a telephone conference.

The Commissioner is authorized to charge any additional fees which may be required, or credit any overpayment, to Conley, Rose & Tayon, P.C. Deposit Account No. 50-1505/5298-03500.

Respectfully submitted,

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attachment to # 10

ATTACHMENT A
"Marked-Up" Amendments

IN THE SPECIFICATION

Please amend pg. 13, lines 10-22 as follows:

In Fig. 4, however, a cross-sectional view of a microelectronic topography suitable for use in an embodiment is shown as configured before performing step 110. Microelectronic topography 200 is shown with a dielectric layer 202 arranged above a lower portion 201 of the microelectronic topography. Microelectronic topography lower portion 201 may include a substrate and any layers and materials formed above the substrate from which microelectronic products (e.g., semiconductor devices) may be produced. Preferably, microelectronic topography lower portion 201 includes a semiconductor substrate, and more preferably a lightly doped, single-crystal silicon substrate. Active devices, such as MOS transistors, may be arranged upon and within the semiconductor substrate. The active devices may be isolated from each other using isolation structures. In an alternate embodiment, [Microelectronic] microelectronic topography lower portion 201 may include a substrate composed of a non-semiconducting material. Such non-semiconducting materials may include metals and ceramics.

Please amend pg. 15, lines 21-26 as follows:

Referring back to Fig. 1, microelectronic topography 200 is preferably transferred to a wetting layer deposition chamber (step 120) after pre-cleaning process 110 is complete. Transfer of the microelectronic topography between the pre-cleaning chamber and the wetting layer deposition chamber, and between two chambers in general in an embodiment, preferably is performed under high vacuum (e.g., 10^{-9} torr). The wetting layer may then be ion metal plasma deposited into the cavity (step 130).

Please amend pg. 16, line 26 - pg. 17, line 3 as follows:

Fig. 2 presents a schematic view of a wetting layer deposition chamber in which ion metal plasma deposition 130 may be performed to deposit wetting layer 212. Wetting layer deposition chamber 300 may include a target 302, a pedestal 306, and an ionizing element [310] 320. Microelectronic topography 200 may be placed upon pedestal 306 during deposition of a wetting layer using chamber 300. Wetting layer deposition chamber 300 is preferably configured to perform ion metal plasma deposition processes. Deposition chamber 300 may be obtained and/or configured as a chamber in a multi-chamber system such as the Endura PVD 5500, available from Applied Materials (Santa Clara, CA).

Please amend pg. 17, lines 18-26 as follows:

Ionizing element [310] 320 is preferably arranged between target 302 and pedestal 306, and is preferably configured to ionize at least a portion of the metal atoms sputtered from target 302 before the metal ions reach pedestal 306. More preferably, ionizing element [310] 320 includes [an] induction coil 310 configured around wetting layer deposition chamber 300 and mounted near or on sidewalls [310] 311 of the chamber. The induction coil may turn around the chamber any number of times. An induction coil power supply 318 may be operably coupled to the induction coil for applying power to the coil. Induction coil power supply 318 may supply RF power to the induction coil during processing. Induction coil power supply 318 may include a matching network.

Please amend pg. 18, line 23 - pg. 19, line 6 as follows:

In an embodiment, once microelectronic topography 200 is transferred to wetting layer deposition chamber 300, it may be positioned above, and preferably upon, pedestal 306. Once the topography is secured on the pedestal, a sputtering gas may be introduced into the chamber from sputtering gas supply 314. The sputtering gas is preferably an inert gas such as argon. The flow rate of the sputtering gas into wetting layer deposition chamber 300 may vary depending on processing goals. The flow rate of the sputtering gas into wetting layer deposition chamber 300 is preferably set at about [6.75-3.25] 3.25-6.75 standard cubic

centimeters per second (sccm), more preferably about 4.5-5.5 sccm, and optimally about 5 sccm. A gas may also be flowed from backside gas supply 324 onto the backside of microelectronic topography 200. The backside gas used is preferably argon. The backside gas flow rate may be about 15 sccm, but may be altered subject to processing considerations. The pumping system is preferably actuated to evacuate gases and byproducts from the chamber to maintain a desired level of vacuum with the chamber.

Please amend pg. 20, lines 14-20 as follows:

Another problem addressed by the present process is the build-up of deposited metal on tapered portions 210 of the cavity sidewalls. During deposition, deposited metal can accumulate on the [taped] <u>tapered</u> portions of the cavity sidewalls to such an extent that the metal overhangs (or shadows) lower portions of sidewalls 208. When this happens, deposited metal cannot reach the shadowed sidewall portions, and thus these areas may not receive sufficient coverage. This is particularly a problem for the lower sidewall portions, which are perhaps the portions most likely to be shadowed.

Please amend pg. 22, lines 1-12 as follows:

After a wetting layer 212 of the desired thickness has been formed, deposition of the wetting layer may be terminated. Referring back to Fig. 1, microelectronic topography 200 may then be transferred from wetting layer deposition chamber 300 into a bulk layer deposition chamber (step 140). Again, transfer of the microelectronic topography between chambers is preferably done under high vacuum. The microelectronic topography is preferably immediately transferred to the bulk metal deposition chamber after deposition of the [waiting] <u>wetting</u> layer is complete. In any case, bulk metal layer deposition 150 is preferably the first metal deposition process performed on the microelectronic topography after depositing the [waiting] <u>wetting</u> layer. That is, while other processing steps may be performed in between deposition of the [weight] <u>wetting</u> layer <u>and the</u> deposition of the bulk metal layer, e.g. cleaning processes, there are preferably no intervening processes between steps 130 and 150 in which a metal layer is deposited.

Please amend pg. 22, lines 14-25 as follows:

Once in the bulk metal layer deposition chamber, a bulk metal layer may be sputter deposited within the cavity for filling the cavity. The bulk metal layer is preferably deposited on upon the wetting layer. Deposition of the [wetting] bulk metal layer is preferably performed in a single deposition chamber (the bulk metal layer deposition chamber) until the cavity is substantially filled. That is, deposition of the bulk layer is preferably undertaken until the level of metal within the lateral boundaries of the cavity is at least as high as the top of the cavity, even though there may be voids within the metal in the cavity. In addition, deposition of the bulk metal layer is not required to be performed continuously (e.g., deposition may be halted at some point), but it is preferred that the entire bulk metal layer be deposited in a single chamber. The bulk metal layer is may also be deposited above, and preferably upon, the upper surface of the wetting layer outside of the cavity.

Please amend pg. 23, lines 15-24 as follows:

Fig. 7 presents a cross-sectional view of microelectronic topography 200 after cold sputter depositing the first portion of the bulk metal layer into the cavity. In a preferred embodiment, first portion 214 of the bulk metal layer may be deposited above, and more preferably directly upon, wetting layer 212 both within and outside of cavity 204. First portion 214 of the bulk metal layer is preferably deposited by cold sputter deposition such that immediately after being deposited, the first portion of the bulk metal layer is not configured to significantly reflow. That is, while it may be made to reflow subsequently, it is not configured or capable of reflowing immediately after being deposited. After being deposited, the first portion of the bulk metal layer preferably does not fill cavity 204.

Please amend pg. 25, lines 6-15 as follows:

Target 402 is preferably attached to a target assembly [406] 404 fixably coupled to a top wall 408 of chamber 400. Target 402 is preferably composed of a metal having the desired composition as the bulk metal layer to be deposited. Preferably, target 402 is primarily composed of aluminum or an aluminum alloy. Target assembly 404 preferably includes the

structural and electric assembly related to target 402. Target assembly 404 may also include magnetizing elements and mechanisms for operating such magnetizing elements. A target power supply 416 may be operably coupled to target assembly 404 for applying power to target 402. Target power supply 416 is preferably configured to supply DC power to target 402 for ionizing and attracting sputtering gas atoms towards the target for sputtering metal off of the target during processing.

Please amend pg. 26, lines 10-22 as follows:

In an embodiment, once microelectronic topography 200 is transferred to bulk metal layer chamber 400, it may be positioned above, and preferably upon, pedestal 406. Cold sputtering of first portion 214 of the bulk metal layer may then begin. Once topography 200 is secured on pedestal 406, a sputtering gas may be introduced into chamber 400 from sputtering gas supply 414. The sputtering gas is preferably an inert gas such as argon. The flow rate of the sputtering gas into [wetting] <u>bulk metal</u> layer deposition chamber 400 may vary depending on processing goals. The flow rate of the sputtering gas into [wetting] <u>bulk metal</u> layer deposition chamber 400 is preferably about 25-55 sccm, more preferably about 35-45 sccm, and optimally about 40 sccm. During cold sputtering of first portion 214 of the bulk layer, backside gas is preferably not supplied to the backside of microelectronic topography 200. The pumping system is preferably actuated to evacuate gases and byproducts from chamber 400 to maintain a desired level of vacuum with the chamber.

Please amend pg. 28, lines 2-11 as follows:

It should be understood that hot sputtering may not begin in a technical sense (i.e., the deposited metal is still not configured to substantially reflow) until a short while after the actual process conditions are changed from those of hot sputtering to those of cold sputtering. It should be appreciated that regardless of the processing conditions used, the technical accuracy labels of the labels "hot" or "cold" sputtering may <u>be</u> determined by the behavior of a material, e.g., immediately after being deposited. As such, a portion of the material deposited during processing conditions that fall under the classification "hot sputtering" may actually be "cold"

sputtered, and vice versa. Therefore, when referring to only the process conditions of deposition, the terms "hot sputtering" and "cold sputtering" are used merely for convenience.

Please amend pg. 34, lines 3-10 as follows:

A method for fabricating a metallization structure is presented. The method preferably includes ion metal plasma depositing a wetting layer within a cavity defined in a dielectric layer. The wetting layer preferably includes titanium. The method preferably further includes sputter depositing a bulk metal layer within the cavity and upon the wetting layer. Sputter depositing of the bulk metal layer is preferably performed in a single deposition chamber at least until the cavity is substantially filled.

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<u>IN THE CLAIMS:</u>

Please cancel claims 19 and 20. Please amend claims 1, 3-5, 7-9, and 12-18 as follows:

1. (Amended) A method for fabricating a metallization structure, comprising:

ion metal plasma depositing a wetting layer [upon a topography] <u>within a cavity of a dielectric layer</u>;

<u>applying a sufficient bias power to splash deposited metal at the bottom of the cavity to sidewalls of the cavity;</u> and

sputter depositing, within a single chamber, substantially [the] <u>an</u> entirety of a bulk metal layer upon the wetting layer.

3. (Amended) The method of claim 1, [wherein said topography comprises a cavity in a dielectric, and] wherein said sputter depositing comprises sputter depositing the bulk metal layer within the cavity until the cavity is substantially filled.

4. (Amended) The method of claim [3] 1, wherein said wetting layer comprises titanium.

5. (Amended) The method of claim [4]1, wherein the topography [is a microelectronic topography and further] comprises [(i)] a lower portion of [the] a microelectronic topography below said dielectric layer, [and (ii) cavity sidewalls around the cavity,] and wherein said ion metal plasma depositing a wetting layer comprises depositing the wetting layer upon the sidewalls of the cavity and upon an upper surface of the microelectronic topography directly below the cavity.

7. (Amended) The method of claim 1, wherein said ion metal plasma depositing a wetting layer [further comprising] comprises:

applying a sufficient DC power to a target to induce sputtering of metal atoms from the target and towards a pedestal below the [microelectronic] topography, wherein the sputtered metal atoms comprise titanium;

applying a sufficient RF power to an induction coil between the target and the pedestal to ionize at least a portion of the metal ions sputtered from the target; and

applying [a] the sufficient pedestal bias power to the pedestal to direct the ionized metal atoms towards the dielectric layer in a direction substantially normal to the dielectric layer.

8. (Amended) The method of claim [6] 1, wherein the cavity comprises a via in the dielectric layer and extending to a conductive region of the topography.

9. (Amended) The method of claim [6] 1, further comprising pre-cleaning said topography prior to said ion metal plasma depositing.

12. (Amended) A method for fabricating a metallization structure, comprising:

in a first deposition chamber, ion metal plasma depositing a wetting layer comprising titanium within a cavity in a dielectric layer above a microelectronic topography;

in a second deposition chamber, [cold] sputter depositing <u>at a first temperature</u> a first portion of a bulk metal layer comprising aluminum within the cavity; [and] subsequently

in said second deposition chamber, [hot] sputter depositing <u>at a second temperature</u> a second portion of the bulk metal layer within the cavity<u>; and subsequently</u>

<u>in said second deposition chamber, sputter depositing at a third temperature a third portion of the bulk metal layer upon said second portion, wherein said third temperature is lower than the second temperature</u>.

13. (Amended) The method of claim 12, wherein said [cold] sputter depositing <u>at the first temperature</u> [a first portion of the bulk metal layer] comprises depositing [a] <u>the</u> first portion of the bulk metal layer under conditions that do not significantly reflow the first portion of the bulk metal layer immediately after being deposited.

14. (Amended) The method of claim [13] <u>12</u>, wherein said [hot] sputter depositing <u>at the second temperature</u> [a second portion of the bulk metal layer] comprises depositing the second portion of the bulk metal layer under conditions that reflow the [first] second portion of the bulk metal layer immediately after being deposited.

15. (Amended) The method of claim 12, wherein said [cold] sputter depositing <u>at the first temperature</u> [a first portion of the bulk metal layer] comprises applying a first DC power to a target in the [bulk metal] <u>second</u> deposition chamber, <u>and wherein</u> said [hot] sputter depositing <u>at the second temperature</u> [a second portion of the bulk metal layer] comprises applying a second [target] DC power to the target, <u>wherein</u> said first DC power is greater than said second DC power.

16. (Amended) The method of claim 12, wherein said [hot] sputter depositing at the second temperature [further] comprises depositing the second portion of the bulk metal layer upon the first portion of the bulk metal layer, and wherein said [cold] sputter depositing at the first temperature [further] comprises depositing the first portion of the bulk metal layer upon the wetting layer.

17. (Amended) The method of claim 12, wherein said [cold] sputter depositing at the first temperature [further] comprises depositing the first portion of the bulk metal layer upon the wetting layer, and wherein said [hot] sputter depositing at the second temperature substantially fills the cavity.

18. (Amended) The method of claim 12, wherein said sputter depositing at the first temperature [a bulk metal layer] is the first deposition process performed after said ion metal plasma depositing a wetting layer.

Please add claims 21-30 as follows:

21. (Added) The method of claim 1, wherein said applying occurs at least partly during said ion metal plasma depositing the wetting layer.

22. (Added) The method of claim 12, wherein the second temperature is higher than the first temperature.

23. (Added) The method of claim 12, wherein said third portion comprises approximately 50% of said bulk metal layer.

24. (Added) A method for fabricating a metallization structure, comprising:

ion metal plasma depositing a wetting layer upon a topography;

applying a gas to the backside of the topography; and

sputter depositing substantially an entirety of a bulk metal layer upon the wetting layer.

25. (Added) The method of claim 24, wherein said applying occurs at least partly during said ion metal plasma depositing the wetting layer.

26. (Added) The method of claim 25, wherein said applying comprises applying approximately 15 sccm of said gas during said ion metal plasma depositing the wetting layer.

27. (Added) The method of claim 24, wherein said applying occurs at least partly during said sputter depositing the bulk metal layer.

28. (Added) The method of claim 27, wherein said sputter depositing comprises depositing a first portion of said bulk metal layer at a first temperature absent of said applying.

29. (Added) The method of claim 27, wherein said sputter depositing comprises depositing a second portion of said bulk metal layer at a second temperature, and wherein said applying comprises applying between approximately 36 sccm and approximately 44 sccm of said gas during said depositing the second portion.

30. (Added) A method for fabricating a metallization structure, comprising:

etching a cavity comprising a base and opposing sidewalls within a dielectric of a topography;

ion metal plasma depositing a wetting layer consisting essentially of titanium and in contact with the base and the sidewalls of said cavity; and

sputter depositing substantially an entirety of a bulk metal layer on and in contact with the wetting layer.

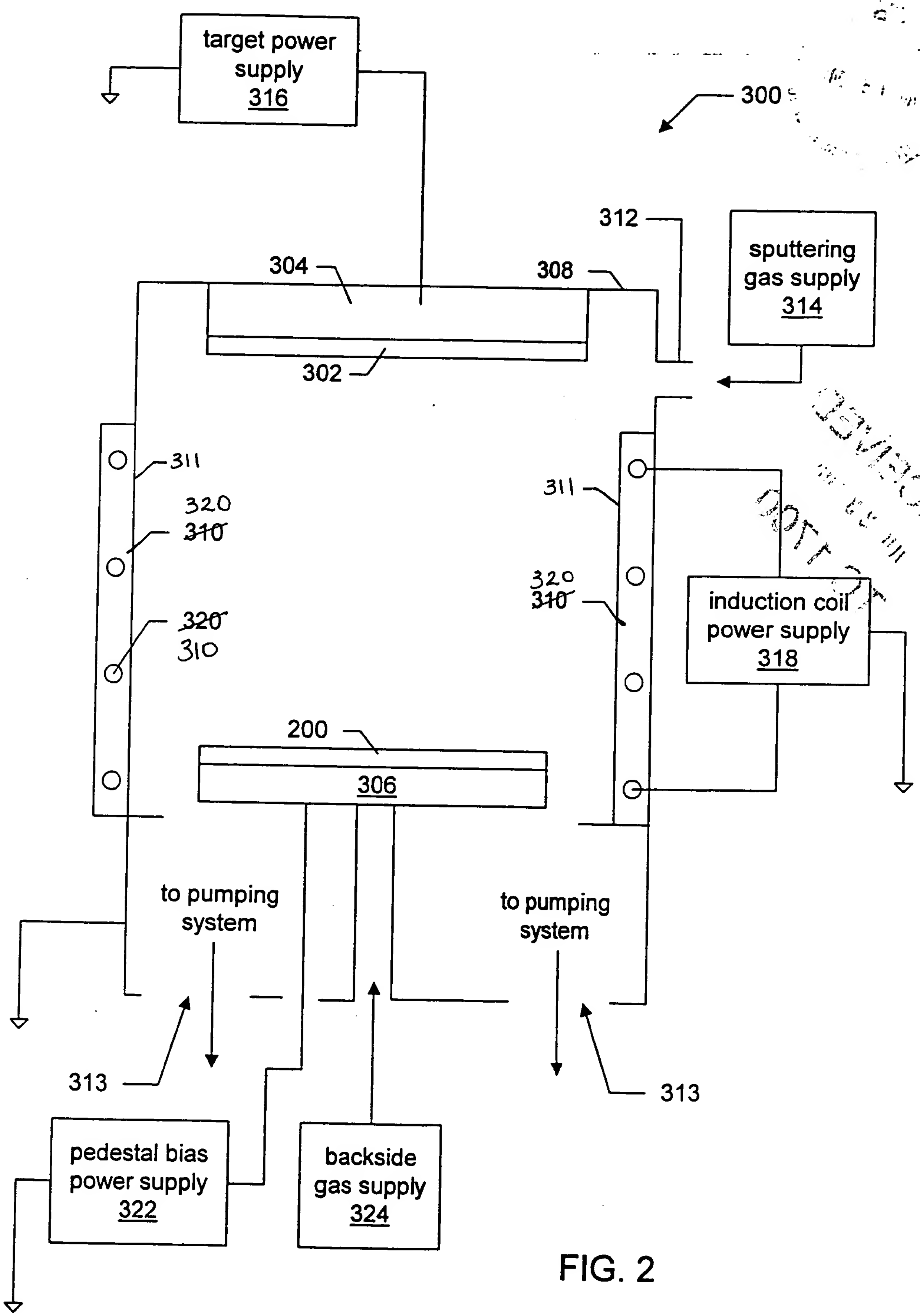
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FIG. 2